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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/006,535	12/05/2001	Federico Carniel	CISCP735	1081

26541 7590 08/27/2003
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EXAMINER

CUNNINGHAM, STEPHEN C

ART UNIT PAPER NUMBER

3663

DATE MAILED: 08/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/006,535

Applicant(s)

CARNIEL ET AL.

Examiner

Stephen C. Cunningham

Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-8,10-14 and 16-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-8,10-14 and 16-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims, 1, 4,5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emori et al. (2002/0021864) (Hereafter "Emori") in view of Namiki Et al. (IEEE J on Selected Topics in Quantum Electronics, 7:1, Jan/Feb 2001, pp. 3-16) (Hereafter "Namiki") and in view of Akasaka et al ('288) (hereafter "Akasaka")

Regarding claim 1, Emori teaches an apparatus for amplifying an optical signal, said apparatus comprising: (1) a fiber (Fig.17, 1); (2) a first group of N optical pump energy sources disposed to propagate optical energy into said fiber in a first direction (Fig. 17, 1350 nm pump light); (3) a second group of N+1 optical pump energy sources disposed to propagate optical energy into said fiber in a second direction opposite to said first direction (fig. 17, 1450 nm and 1490 nm pump sources); and (4) wherein N is greater than or equal to 1, Raman amplification is induced in said fiber (see generally, Abstract), and said optical pump energy sources of said first group and said second group each have distinct pump wavelengths (1350 nm, 1450 nm, and 1490 nm, respectively).

Emori does not teach that the pump wavelengths are selected to substantially flatten the amplification response of said fiber across a desired frequency band, and

wherein the pumping sources alternate with respect to wavelength between forward and backward pumping. The selection of pumping wavelengths for such a purpose is well known in the art. Namiki teaches that by implementing WDM pumping, a flat gain spectrum can be obtained. See generally page 6, section III.

Akasaka teaches alternating wavelength between forward and backward pumping. See, for example, Fig. 15.

It would have been obvious to one of ordinary skill in the art at the time of invention by Applicant to modify the prior art of Emori to include additionally wavelengths alternating between forward and backward pumping, each of which is selected so as to yield a composite flat gain profile, because as is well known in the telecommunications art, this type of a profile is desirable for broad band amplification.

Regarding claim 4, Emori teaches that said first direction comprises a direction of propagation comprises a direction of propagation of the optical signal through said fiber and said second direction comprises a direction opposite to said direction of propagation of said signal through the fiber. See generally, Fig. 17.

Regarding claim 5, Emori does not teach that the second direction comprises a direction of propagation of said signal through said fiber and said first direction comprises a direction opposite to the direction of propagation of said signal through said fiber. In fact, Emori teaches that said first direction comprises a direction of propagation of the optical signal through said fiber and said second direction comprises a direction opposite to said direction of propagation of said signal through the fiber. See generally,

Fig. 17. However, it would have been obvious at the time of the invention by Applicant to switch the forwards and backwards propagating pumping lights of the Emori reference so as to be propagating in opposite directions than that shown because such is merely the reordering of essential components, which would not result in any unexpected results. Additionally, it would have been obvious since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70.

Regarding claim 6, Emori does not teach that the gain profile induced by the first group of optical pump wavelengths and a second gain profile induced by said second group of optical pump sources compensate each other to produce a substantially flat overall gain profile. Such is taught inherently in the Akasaka disclosure. Akasaka discloses pump sources such that wavelength of the first and second pumps are a first and a third wavelength, and the wavelengths of a third and fourth pumping sources are a second and a fourth wavelength, respectively. Each of the first to fourth wavelengths are adjacent wavelength. See column 14, line 65 to column 15, line 15.

This will inherently provide a compensating gain profile as the Raman shift is approximately 100nm, and therefore the signal wavelength which will receive maximum Raman amplification will also alternate in the same manner as the pumping wavelengths, and thus, the combined spectrum of the first and second pump sources (which have the first and third pumping wavelengths) and the third and fourth pumping sources (which have the second and fourth pumping wavelength) will offset one another to yield a "substantially flat" gain profile. It would have been obvious to one of ordinary

skill in the art at the time of invention by Applicant to modify the Emori Raman amplifier to include a pump arrangement as taught in Akasaka because the gain profile will be substantially flatter and this is an advantageous result.

Regarding claim 7, Emori does not teach that the pumping lights should be depolarized. Such is well known in the art as it substantially eliminates problems associated with the polarization dependent gain of Raman amplifiers. Such is taught in the Namiki reference at page 9 ("Use of depolarizer [sic] to a pump LD is an alternative way to diminish PDG in Raman amplifiers").

Claims 8, 10-14, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akasaka in view of Emori.

Regarding claim 8, Akasaka teaches all of the limitations save for the fact that the first group of pump sources has N pumping sources and the second group contains N+1 pump sources. Such is well known in the art as is taught in the Emori reference. It would have been obvious to utilize the arrangement shown, for example, in Fig. 17 of the Emori reference to allow the lowest wavelength pump (which should be located at the front of the Raman amplifier) to pump the additional wavelengths, which allows for lower noise amplification with a larger bandwidth.

Regarding claims 10-11 and 16-17 see the discussions of claims 4 and 5, above, the discussion of which is hereby incorporated by reference in their entirety.

Regarding claims 12 and 18, see the discussion of claim 6, the discussion of which is hereby incorporated in its entirety.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akasaka in view of Emori as applied to claim 8 above, and further in view of Namiki.

Regarding claim, 13 see the discussion of claim 7, the discussion of which is hereby incorporated by reference in its entirety.

Response to Arguments

Applicant's arguments with respect to claim 1, 4-8, 10-14, 16 and 18 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 3663

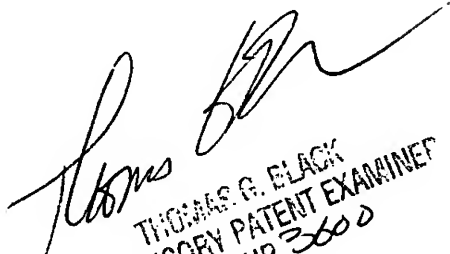
the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen C. Cunningham whose telephone number is 703-605-4275. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G. Black can be reached on 703-305-8233. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

SCC


THOMAS G. BLACK
SUPERVISORY PATENT EXAMINER
GROUP 3663